the viscosity of the plastic and obtain a more uniform pressure profile. For phase change materials having ceramic filled particles, keeping the viscosity low also helps prevent agglomeration of the particles, which can affect the system wide resonance spectrum of the component.

FIGS. 9a-9d illustrates the difference between a process that does not use control with the controlled process of the present invention. In an uncontrolled process the parameters are not controlled to ensure that the end-of-fill pressure reaches a predetermined set point pressure with every shot. FIG. 9a illustrates a graph showing the end-of-fill pressure for various shots in an uncontrolled process. Each peak and valley point on the graph represents the end-of-fill pressure for a single shot. As can be seen, in an uncontrolled process, the end-of-fill pressure varies considerably from shot to shot.

FIG. 9c illustrates the end-of-fill pressure of a controlled process of the present invention. Each peak and valley point on the graph represents the end-of-fill pressure for a shot. As can be seen, in the controlled process of the present invention, the end-of-fill pressure is relatively constant from shot to shot. The maintenance of the this uniformity of the end-of-fill pressure from shot to shot is a significant contributing factor to the ability of obtaining a reproducible resonance spectrum.

FIGs. 9c and 9d illustrate the pressure profiles of the injection pressure 500, beginning-of-fill pressure 510 and end-of-fill pressure 520 without control and with control respectively. As can be seen, the injection pressure 500 is higher than both the beginning-of-fill pressure 510 and the end-of-fill pressure 520. Once

the cavity is nearly filled with molten material, the injection pressure 500 is reduced and the pressure at the beginning-of-fill begins to rise. Once the cavity is full, the injection pressure is kept constant and the end-of-fill pressure rises to the predetermined set point pressure, in the case with control. The part is then allowed to cool and solidify, which causes a significant decrease in the end-of-fill pressure.

By injection molding a phase change material on one or a set of hard disc drive components in accordance with the method of the present invention, it has been found that one could obtain a reproducible resonance spectrum for the molded components. All components have a resonance spectrum. The resonance spectrum of a component can be measured using the industry standard "ping" test. To perform the ping test, the component placed in a clamp next to a microphone or it can be placed in an acoustic chamber. The component is then hit with an impact hammer. A signal processor then measures the harmonic oscillations of the component. A component will have a resonance spectrum that will be defined by peaks at different orders. The first order frequency for a component has the highest energy emission peak.

Shown in FIG. 10 is a table that shows the first order frequency resonance of an encapsulated voice coil motor obtained through the ping test. The data in the table is from parts molded in three different runs. In one run of seven parts, the end-of-fill pressure was held in the range of 4400-4499 psi. In a second run of fourteen parts, the end-of-fill pressure was controlled to be in the range of 4500-4700 psi. In the third run of four parts, the end-of-fill pressure was controlled to

be in the range of 4701-4800 psi. Each part (specimen) was subjected to the ping test and its first order harmonic resonance frequency was determined. The results are recorded in Table I, along with the average, maximum, minimum and standard deviation (Σ) of the resonance frequency of the first order harmonic of the parts produced in that run. The median first order frequency is the median value of all first order frequencies for a batch of identical components molded under a controlled profile. One should understand that by identical components, it is meant that the components are all the same type of component and that they are produced through the same manufacturing process from the same manufacturer. It does not mean that the components are identical down to the microscopic level.

A reproducible resonance spectrum for the present invention is defined such that a batch of one hundred components made by the method of the present invention would have a standard deviation of first order frequency that is less than about 300 Hertz. Preferably the standard deviation is less than about 100 Hertz, more preferably less than about 50 Hertz, and most preferably about 30 Hertz or less. It should be noted that in the data reported in Table I, the standard deviation is only about 20 to 30 Hertz at three different end-of-fill pressures.

The standard deviation of first order resonance frequency is preferably at least about twenty-five percent less, and more preferably at least about fifty percent less, than the standard deviation of first order resonance frequency for a batch of components overmolded without the method of the present invention. Conventional injection molding processes control the injection pressure and either the injection time or the stroke of the extrusion screw in the injection molding